

PATENT SPECIFICATION

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(54) FABRIC CONDITIONING COMPOSITIONS

(71) We, COLGATE-PALMOLIVE COMPANY, a Corporation organised under the laws of the State of Delaware, United States of America, of 300 Park Avenue, New York, New York 10022, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to fabric conditioning compositions.

The washing agents commonly used in laundering consist of soap and/or synthetic detergents, such as long-chain alkyl sulphates or sulphonates and fatty alcohol condensation products, which are usually mixed with builder salts, such as alkali metal carbonates, silicates and/or phosphates. These builder salts have a tendency to react with the calcium and magnesium ions present in the ordinary washing water, whereby mineral salts are precipitated which are liable to be deposited onto the fibres of the textile fabrics during the washing operation, especially if detergent compositions are used that are not capable of keeping the soil and other undissolved substances sufficiently suspended in the washing solution. The mineral salts deposited onto the fibres render the fabrics liable to be weakened, particularly at those parts which are exposed to friction or rubbing, for instance the edges of collars and cuffs. In addition, the deposited mineral salts give the laundered textiles a poor, boardy feel, particularly at those areas of the fabric which are exposed to friction and creasing, such as collars and cuffs. This poor hand of laundered fabrics and resulting discomfort in wear have in part created a demand for softener compositions capable of improving the softness of "hand" of laundered textile fabrics. It has been found that the treatment of such materials with softening

agents improves their softness of feel and may prolong their useful life. Softeners also facilitate ironing by lubricating the fibres so that wrinkling is reduced and friction between fibres and the iron is reduced. Additionally, it has been found that treatment of fabrics with softeners generally results in a fabric having a reduced tendency to accumulate electrical charges which create undesirable static cling.

Many synthetic textile fibres when used alone or incorporated into blends with natural fibres have a propensity to accept and retain soil such as oily grime. Accordingly, when a garment of a fabric made from such fibre or fibre blend is being worn the soil accumulates on the garment and is difficult to remove properly except by a dry cleaning process. The cleaning process normally employed, however, is washing in a conventional home washing machine. During the washing operation it is virtually impossible to remove all of the soil from the garment, while some of the soil that is removed from the garment into the wash water is redeposited onto the garment. Hence, the garment is not properly cleaned.

The problem with washing fabrics having synthetic fibres incorporated therein, or made entirely of synthetic fibres, is that the synthetic fibres, as well as being hydrophobic, are oleophilic. Therefore, while the oleophilic characteristics of the fibre permit oily soil to be readily embedded therein, the hydrophobic properties of the fibre prevent water from entering the fibre to remove contaminants therefrom. Attempts have been made to reduce oleophilic characteristics of synthetic fibres by coating the fibres with a coating that is oleophobic, i.e. will hinder the attachment of oily soil to the fibres. Many polymer systems have been proposed which are capable of forming a film around the fibres, particularly acid emulsion polymers prepared from organic

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acids having reactive points of unsaturation. These treating polymers are known as soil-release agents.

The term "soil-release" as used herein refers to the ability of the fabric to be washed or otherwise treated to remove soil, including oily soil, that has come into contact with the fabric.

Concentrated solutions of soil-release agents have been padded onto fabrics by textile manufacturers to impart a permanent soil-release finish to the fabric. As the amount of soil-release agent on the fabric is increased, the capability of the fabric to release soil is increased. However, fabrics with this permanent soil-release finish have disadvantages. As the amount of soil-release agent on the fabric is increased, the fabric has a tendency to become stiffer and lose the desirable hand characteristics of the fabric. Fabrics with a heavy application of soil-release agent do not have the same desirable appearance and hand as the same fabrics without the soil-release coating. Furthermore, in practice there is a set range of soil-release agents that can be applied, dictated by commercial success.

It has now been discovered that dilute solutions of anionic surfactants give unexpectedly good softening and a smooth, non-scratchy, soft feeling to natural and synthetic fabrics when sprayed directly onto the fabrics and that if such solutions also contain a silicone polymer lubricant they are useful as ironing aids; that is to say, they make it easier to push the iron over the fabric during a subsequent ironing operation. After the treated fabrics are ironed they have good soil-release characteristics. According to the invention a fabric conditioning composition comprises an aqueous solution of more than 0.5%, but not exceeding 10% by weight of an anionic surfactant selected from alkyl benzene sulphonates wherein the alkyl group has from 10 to 20 carbon atoms, alkyl toluene sulphonates wherein the alkyl group has from 10 to 20 carbon atoms, sulphated or sulphonated aliphatic alcohols having from 10 to 20 carbon atoms, ethoxylated alcohol sulphates produced from an aliphatic alcohol having from 10 to 20 carbon atoms ethoxylated with from 1 to 6 moles of ethylene oxide, weak soluble soaps of fatty acids having from 10 to 20 carbon atoms, olefin sulphonates having from 10 to 20 carbon atoms, paraffin sulphonates having from 10 to 20 carbon atoms, N - (2 - hydroxyalkyl)-amino acids having from 10 to 20 carbon atoms in the alkyl chain, and mixtures thereof, which solution also contains from 0.15% to 1.5% by weight of a silicone polymer lubricant and an organic solvent.

The compositions of the present invention do not wholly prevent the attachment of soil to the fabric, but hinder such attachment and render the fabric susceptible to successful cleaning by a washing operation. While

the reason for this result is still uncertain, it may be that soiled, treated fabric when immersed in detergent-containing wash water experiences an agglomeration of oil at the surface. These globules of oil are then removed from the fabric and rise to the surface of the wash water. This phenomenon takes place in the home washing machine during continued agitation, but the same effect has been observed even under static conditions. For example, a strip of polyester/cotton fabric treated with a fabric conditioning composition in accordance with the present invention and soiled with crude soil, when simply immersed in a detergent solution will lose the oil even without agitation.

The alkyl benzene sulphonates and alkyl toluene sulphonates may be prepared by sulphonating the corresponding alkylaromatic hydrocarbons. Some sulphonation processes utilize 100% sulphuric acid or weak oleum, although anhydrous sulphur trioxide can also be used. Excess unsaponifiable material is removed from the sulphonation mixture prior to neutralization to obtain alkylarylsulphonates of low salt content. The resulting alkylaryl-sulphonates may be deodorized by treatment with superheated steam or hot nitrogen gas. The colour can be substantially removed from the alkylarylsulphonates by treating an aqueous solution of the sulphonate with hydrogen and a hydrogenation catalyst at elevated temperatures.

The sulphated and sulphonated alcohols may be prepared by sulphation or sulphonation of alcohols such as are produced from coconut oil, tallow or palm seed oil by esterification of the fatty acids with lower aliphatic alcohols and reduction of the mixture of esters with sodium. Sulphonation is carried out at elevated temperatures with fuming sulphuric acid, sulphur trioxide or chlorosulphonic acid.

The ethoxylated alcohol sulphates may be derived from linear aliphatic alcohols having a carbon chain of from 10 to 20 atoms which has been reacted with from 1 to 6 moles of ethylene oxide. The longer the alkyl group, the more moles of ethylene oxide can be reacted with a mole of the alcohol. The ethoxylated alcohol sulphates are commonly prepared by reaction of the appropriate alcohol with sufficient ethylene oxide followed by sulphation of the reaction product in known manner, such as by the use of oleum or chlorosulphonic acid. The purity of the reaction product is a consideration for the manufacture of a composition having optimum properties. Depending upon the method of manufacture, there are usually present varying amounts of organic impurities in admixture with the sulphated ethoxylated alcohols. The organic impurities may include unreacted nonionic (unsulphated) ethoxylated alkyl materials and small amounts of degradation products such as partially de-ethoxylated products. These

organic impurities should be kept to a minimum since an excessive amount has been found to affect adversely the physical properties and performance of the product. More particularly an excessive amount, particularly of the unreacted nonionic ethoxylated alkyl material, has a tendency to raise the cloud point, inhibit foam and decrease the efficiency of the product as an emulsifier of greasy soil in washing operations. The product may contain a minor amount of such organic unreacted or by-product materials provided that the amount is insufficient substantially to affect the properties of the product adversely. In general, the ethoxylated alcohol sulphate material should have a purity of at least 75% by weight of the total organic solids in the material, with up to 25% of other organic solids. For optimum effects, it is preferred that the organic solids of the ethoxylated alcohol sulphate material should contain not substantially in excess of 10% unsulphated ethoxylated alcohol by weight of the organic solids in the ethoxylated alcohol sulphate material. A typical product may contain about 10% of impurities on an organic solids basis. The impurities are kept to these low levels by any suitable technique. The careful control of conditions in the sulphation procedure, including the time of reaction and the choice of sulphating agent will produce materials of desired purity. If desired, the reaction product may be purified to remove the organic impurities, such as by the use of an ion-exchange technique.

The soaps are soaps of carboxylic acids having a carbon chain length of from 10 to 20 carbon atoms. Water-soluble soaps, such as sodium and potassium and other suitable alkali metal soaps, or soaps of nitrogenous bases such as ammonia or triethanolamine, derived from fats and oils such as tallow, coconut oil, cottonseed oil, soybean oil, corn oil, olive oil, palm oil, peanut oil, palm kernel oil, lard, greases and fish oils, as well as their hydrogenated derivatives and mixtures thereof, may be used.

The olefin sulphonates can be made from Fischer-Tropsch hydrocarbons, made by the hydrogenation of carbon monoxide and which contain a relatively high proportion of straight-chain olefins. The olefin sulphonates may also be derived from alpha olefins or olefins in which the double bond is randomly distributed along the chain. The sulphonation is carried out at low temperatures to avoid polymerization and side reactions. Certain fractions of shale oil are rich in olefins, and these can be sulphonated to form anionic surfactants. The starting materials and the final product, however, require considerable purification if surfactants of good colour and softening characteristics are to be obtained.

To prepare the paraffin sulphonates, the paraffins may be oxidized to fatty acids by air-

blowing at temperatures below 150°C in the presence of small amounts of potassium permanganate. An alternative oxidation process involves oxidation with nitrogen dioxide dissolved in sulphuric acid. The resulting acids are then sulphonated by conventional means, such as by the use of oleum or chlorosulphonic acid.

To prepare the N - (2 - hydroxyalkyl)-amino acids, epoxidized alpha olefins may be reacted with amino acids such as sarcosine (N-methyl glycine) and imino diacetic acid. A typical acid for use in the compositions of the present invention is N - (2 - hydroxyalkyl) sarcosine.

The anionic surfactants are dissolved in water to make a solution which can be sprayed directly onto wet or dry fabrics. The anionic surfactant is present in the solution in a proportion of more than 0.5% but not exceeding 10% by weight, preferably from 1% to 5% by weight. In addition to the anionic surfactant, the fabric conditioning compositions of the present invention may contain perfumes, germicides and agents to resist attack of fungus and mildew.

A method for conditioning a fabric having synthetic fibres incorporated therein, comprising spraying the fabric with a composition comprising an aqueous solution of from 0.5% to 10% by weight of an anionic surfactant as aforesaid, which solution may also contain a silicone polymer lubricant, is the subject of our British Patent Application No. 56037/73 (Serial No. 1458836) from which the present Application has been divided.

As already indicated, the fabric conditioning compositions also serve as ironing aids, due in part to the presence of the silicone polymer lubricant. The proportion of silicone polymer lubricant needed is small, namely in the range from 0.15% to 1.5%. Suitable silicone polymer lubricants include the dimethylpolysiloxane fluids. To aid in dispersing the silicone polymer in the aqueous medium, an organic solvent is present, e.g. in a proportion in the range from 5% to 20% by weight; the preferred organic solvents are ethanol, propanol, isopropanol and ethylene glycol.

The preferred manner of application of the compositions is from pressurised containers of the "aerosol" type, such as are common for various household purposes, and which dispense the composition in the form of a spray. The general technology of such pressurized containers is applicable to this invention and need not be set forth in detail. Gases and liquefied gases such as nitrogen, isobutane, halogenated hydrocarbons and carbon dioxide are useful as the propellant.

The composition is preferably applied to the fabrics by placing the fabrics horizontally on a surface such as an ironing board. The container is held approximately 18-24 inches away, and the spray is applied lightly

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- and evenly over the entire surface. Particular areas of the fabric may be treated with heavier sprays where greater softening and/or soil-release properties are required. While the preferred means of application is from a pressurized container, other types of spray applicators may be used.

The following Examples illustrate the invention. All percentages are by weight.

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Example I.

An ironing aid composition incorporating an anionic surfactant and imparting good softness and soil-release to fabrics treated therewith was formulated as follows:

	Percent by Weight	
Silicone polymer*	0.5	
Ethanol	10.0	
Linear tridecyl benzene sulphonate	1.0	20
Deionized water	88.5	

*35% AI oil-in-water emulsion of dimethylpolysiloxane of viscosity 60,000 \pm 5 centistokes

A stiffening agent may be included to aid in keeping wrinkles from reforming immediately after ironing. A 0.5% by weight concentration of starch or other film forming agent was found to be adequate.

Example II.

Ironing aid compositions incorporating a small amount of starch were formulated:

	Percent by Weight	
Silicone polymer (dimethyl polysiloxane)	0.5	0.2
Ethanol	10.0	5.0
General Electric "Antiform 20"	0.5	0.2
Perfume	0.03	0.05
Linear tridecyl benzene sulphonate	1.0	1.0
Starch	0.5	1.0
Deionized water	87.47	92.55

- 35 Example III.
Ironing aid compositions can be formu-

lated from mixtures of anionic surfactants, including soap, as follows:

	Percent by Weight	
Dimethylpolysiloxane	0.5	0.5
Ethanol	10.0	10.0
Linear tridecyl benzene sulphonate	1.0	1.0
Soap (sodium soap of mixed coconut and tallow acids)	2.0	1.0
Deionized water	86.0	87.0
Perfume	0.5	0.5

- 40 The fabric conditioning compositions of the present invention give excellent fabric softening and soil-release characteristics to fabrics treated therewith. The compositions of the present invention are generally lower in cost than the conventional cationic soft-

ers. Since cationics are substantive to cotton and tend to hold onto soils, the anionics, which are not substantive, give superior oil-release. Since the compositions of the present invention are intended to be sprayed on, and then ironed dry or allowed to air dry, a por-

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tion of the article to be treated may be selected, rather than treating the entire article as in the washing machine softening methods. The compositions of the present invention allow a controlled amount of treatment for individual fabrics, depending on the desired effect on the fabric:

WHAT WE CLAIM IS:—

1. A fabric conditioning composition comprising an aqueous solution of more than 0.5% but not exceeding 10% by weight of an anionic surfactant selected from alkyl benzene sulphonates wherein the alkyl group has from 10 to 20 carbon atoms, alkyl toluene sulphonates wherein the alkyl group has from 10 to 20 carbon atoms, sulphated or sulphonated aliphatic alcohols having from 10 to 20 carbon atoms, ethoxylated alcohol sulphates produced from an aliphatic alcohol having from 10 to 20 carbon atoms ethoxylated with from 1 to 6 moles of ethylene oxide, water soluble soaps of fatty acids having from 10 to 20 carbon atoms, olefin sulphonates having from 10 to 20 carbon atoms, paraffin sulphonates having from 10 to 20 carbon atoms, N - (2 - hydroxyalkyl)-

amino acids having from 10 to 20 carbon atoms in the alkyl chain, and mixtures thereof, which solution also contains from 0.15% to 1.5% by weight of a silicone polymer lubricant and an organic solvent.

2. A fabric conditioning composition as claimed in Claim 1 wherein the anionic surfactant is linear tridecyl benzene sulphonate.

3. A fabric conditioning composition as claimed in Claim 1 or Claim 2 in which the silicone polymer lubricant is a dimethylpolysiloxane.

4. A fabric conditioning composition as claimed in Claim 1 and substantially as described in any of the Examples.

5. A pressurized container containing a fabric conditioning composition as claimed in any of the preceding Claims and a propellant, and having a discharge valve actuatable to dispense the composition from the container in the form of a spray.

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